

WE CLAIM:

1. A method of continuously capturing BioOil and its constituents from a gas stream produced in a fast pyrolysis/thermolysis process, in a usable liquid form so as to produce a non-condensable gas free of fouling
5 contaminates, comprising:

(a) separating BioOil and its constituents from a gas stream using hot inertial separation to maintain the BioOil and its sticky and/or thick
10 constituents at a temperature below its point of rapid degradation and above a point at which its viscosity is low enough to avoid inefficient operation of the separation equipment;

(b) reducing gas velocity to a temperature sufficiently low to allow droplets in the gas stream to settle out but high enough so that a
15 viscosity of said droplets remains low enough to avoid inefficient operation of the separation equipment; and

(c) condensing vapour in the gas stream..

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2. The method of claim 1, including collecting liquid from the gas stream produced by the pyrolysis/thermolysis process.

3. The method of claim 2, wherein the step of separating BioOil includes providing a first cyclone separator to collect liquid in a range of 5 microns and greater.
- 5 4. The method of claim 3, wherein the step of separating BioOil includes providing a meandering pipe following said first cyclone separator to collect liquid having a sub-micron particle range and greater.
5. The method of claim 3, including providing a BioOil, wax and char collection tank coupled to a discharge outlet of said first cyclone separator. operating in a temperature low enough to condense remaining free flowing liquids but about a freezing point of said liquids to increase retention time of the gas stream and slow down a rate of gas volume flow.
- 15 6. The method of claim 2, including providing a settling section following said hot inertial separation section.
7. The method of claim 6, wherein said settling section includes a gas tank.
- 20 8. The method of claim 6, wherein said condensing step takes place in a condensing section whose temperature is in a range of 5 to 20 degrees C.
9. The method of claim 8, wherein said condensation section includes a gas

cooler.

10. The method of claim 9, including providing a second cyclone separator coupled to an outlet of said gas cooler operative to collect condensate that
5 has been re-entrained in the gas stream in gas cooler.

11. The method of claim 10 including providing a condensate collection tank coupled to an outlet of said second cyclone separator.

10 12. The method of claim 11, including return lines coupled to outlets of said first cyclone collection tank, said gas tank and said condensate collection tank operative to return collected liquid to the gas stream prior to the separation step.

15 13. Apparatus for continuously capturing BioOil and its constituents from a gas stream produced in a fast pyrolysis/thermolysis process, in a usable liquid form so as to produce a non-condensable gas free of fouling contaminates, comprising:

20 (a) a separator operative to separate BioOil and its constituents from a gas stream and to maintain the temperature of said BioOil and its constituents such that its sticky and/or thick constituents are below a point of rapid degradation but above

a point at which their viscosity is low enough to avoid inefficient operation of the separation equipment;

5 (b) a gas retention apparatus operative to reduce gas velocity with a temperature sufficiently low to allow droplets in the gas

stream to settle out but high enough so that a viscosity of said droplets remains low enough to avoid inefficient operation of the separation equipment; and

10 (c) a condensing section coupled to an outlet of the gas retention apparatus operative to cool the gas to a temperature low enough to condense vapours into a free flowing liquid but above a freezing point of said liquids.

15 14. The apparatus of claim 13, wherein said separator is an inertial separator to collect liquid in a range of 5 microns and greater.

15. The apparatus of claim 14, wherein said inertial separator includes a first cyclone separator.

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16. The apparatus of claim 13, including a product tank for storing liquid from said pyrolysis/thermolysis process and having an outlet coupled to an inlet of said first cyclone separator.

17. The apparatus of claim 13, wherein said separator further includes a meandering pipe coupled to an outlet of said inertial separator operative to collect BioOil droplets, wax, resin, char and aerosol in a sub-micron size
5 and greater.
18. The apparatus of claim 15, including a first cyclone collection tank coupled to a discharge outlet of said first cyclone separator, said first cyclone collection tank operative to collect BioOil, wax and char.
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19. The apparatus of claim 17, wherein said gas retention apparatus is a gas tank, which reduces gas velocity of the gas stream.
20. The apparatus of claim 13, wherein said condensation section includes a
15 gas cooler.
21. The apparatus of claim 20, including a second cyclone separator coupled to an outlet of said gas cooler operative to separate out liquid that has been re-entrained in the gas stream.
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22. The apparatus of claim 21, including a condensate collection tank coupled to an outlet of said second cyclone separator.

23. The apparatus of claim 22, including return lines coupled to outlets of said first cyclone collection tank, said gas tank and said condensate collection tank, operative to return collected liquid to said product tank.